IN THE CLAIMS:

Please re-write the claims to read as follows:

1   1. (Original) A pattern matching engine for use in searching network messages

2   for pre-defined regular expressions and for determining matches thereto, the pattern

3   matching engine comprising:

4   a.regular expression storage device for storing the pre-defined regular expressions

5   and one or more corresponding actions that are to be applied to network messages match-

6   ing the respective regular expressions, the storage device including a content-addressable

7   memory (CAM) having a plurality of entries containing at least the pre-defined regular

8   expressions; and

9   a decoder circuit coupled to the regular expression storage device, the decoder

10   circuit configured to control an input to the CAM that includes a given network message

11   or selected portion thereof for comparison with the regular expressions contained within

12   the CAM, and to receive and decode an output returned from the regular expression stor-

13   age device, the output identifying the action to be applied to the given network message

14   or portion thereof,

2

15   whereby the CAM is configured such that each network message or portion

16   thereof input to the CAM is compared against all CAM entries at the same time, allowing

17   high-speed pattern matching of network messages.

1   2. (Original) The pattern matching engine of claim 1 wherein each CAM entry

2   further contains a tag such that all CAM entries having the same tag define a single logi-

3   cal CAM within the CAM, and further wherein the decoder circuit is configured to con-

4   strain the matching of a given CAM input to the CAM entries corresponding to a selected

5   logical CAM.

1   3. (Original) The pattern matching engine of claim 2 further comprising a barrel

2   shifter operatively coupled to the decoder circuit, the barrel shifter configured to provide

3   a selected portion of a network message to the CAM input as directed by the decoder cir-

4   cuit.

1   4. (Original) The pattern matching engine of claim 3 further comprising a second

2   decoder circuit coupled to the regular expression storage device, and a second barrel

3   shifter operatively coupled to the second decoder circuit, wherein the second decoder cir-

4   cuit and second barrel shifter apply a selected portion of a second network message to the

5   regular expression storage device in parallel fashion with the decoder circuit and barrel

6   shifter.

3

1   5. (Original) The pattern matching engine of claim 3 wherein the CAM input

2   comprises a message data space for storing the network message or portion thereof pro-

3   vided by the barrel shifter, a tag space for storing the selected tag, and an end flag indi-

4   cating whether the message data space contains a last segment of the respective network

5   message.

1   6. (Original) The pattern matching engine of claim 5 wherein the output returned

2   by the regular expression storage device comprises an operation code for identifying the

3   action to be applied to the respective network message and, to the extent further search-

4   ing is to be performed on the respective network message, an offset for use in directing

5   the barrel shifter to select a new message portion for a subsequent CAM input and a tag

6   to be appended to the subsequent CAM input.

1   7. (Original) The pattern matching engine of claim 6 wherein the output further

2   returned by the regular expression storage device further comprises a done flag, which, if

3   asserted, indicates that processing of the respective message is complete.

1   8. (Original) The pattern matching engine of claim 7 further comprising a pre-

2   parser logic circuit configured to extract one or more selected fields from network mes-

3   sages received at the pattern matching engine and to append those selected fields to the

4   respective network messages prior to inputting the messages to the CAM.

4

1   9. (Original) The pattern matching engine of claim 8 wherein a first action output

2   by the regular expression storage device is a call action that comprises first and second

3   tags, and the pattern matching engine further comprises a subroutine stack coupled to the

4   decoder circuit for temporarily storing the second tag while the respective message is

5   searched under the first tag.

1   10. (Original) The pattern matching engine of claim 8 wherein a second action

2   output by the regular expression storage device is a counter action, and the pattern match-

3   ing engine further comprises a counter memory coupled to the decoder circuit, the

4   counter memory having one or more counters that may be selectively actuated by the de-

5   coder circuit in response to the counter action.

1   11. (Original) The pattern matching engine of claim 8 wherein a third action out-

2   put by the regular expression storage device is a copy action, and the pattern matching

3   engine further comprises a message field memory coupled to the decoder circuit for stor-

4   ing information in response to the copy action.

1   12. (Original) The pattern matching engine of claim 1 wherein the regular ex-

2   pression storage device further includes a second memory structure having a plurality of

3   entries for storing the actions to be applied to the network messages, wherein each entry

4   of the second memory structure is associated with a corresponding entry of the CAM and

5

5   stores the action to be applied to network messages matching the regular expression of its

6   corresponding CAM entry.

1   13. (Original) The pattern matching engine of claim 12 wherein the second mem-

2   ory structure is a random access memory (RAM).

1   14. (Original) The pattern matching engine of claim 13 wherein the CAM is a

2   ternary content addressable memory (TCAM) that supports don't care values.

1   15. (Currently Amended) A method for searching network messages for pre-

2   defined regular expressions in order to apply a selected action to network messages

3   matching a given regular expression, the method comprising the steps of:

4   storing the pre-defined regular expressions in a content-addressable memory

5   (CAM) having a plurality of entries;

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7   ~~associating each CAM entry with the action that corresponds to the regular ex-~~

8   ~~pression stored at the respective CAM entry;~~

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10   _____ decoding a given network message, or selected portion thereof, for comparison

11   with the regular expressions contained within the CAM;

12   inputting a decoded portion of the given network message to the CAM for com-

13   parison with all of the regular expressions stored therein; ~~and~~

6

14   decoding an output returned from the CAM; and

15   identifying, in response to the decoded output, the action that corresponds to a

16   first CAM entry matching the inputted network message or selected portion thereof,

17   whereby input to the CAM is compared against all CAM entries at the same time, allow-

18   ing high-speed pattern matching of network messages.

1   16. (Original) The method of claim 15 wherein the step of associating comprises

2   the step of providing a second memory structure having a plurality of entries for storing

3   the actions to be applied to the network messages, wherein each entry of the second

4   memory structure is associated with a corresponding entry of the CAM and stores the ac-

5   tion to be applied to network messages matching the regular expression of its correspond-

6   ing CAM entry.

1   17. (Original) The method of claim 16 further comprising the step of appending a

2   tag to the given network message or selected portion thereof that is input to the CAM,

3   and further wherein each CAM entry contains a tag value such that all CAM entries hav-

4   ing the same tag value define a single logical CAM within the CAM.

1   18. (Original) The method of claim 17 wherein the CAM is a ternary content ad-

2   dressable memory (TCAM) and the second memory structure is a random access memory

3   (RAM).

7

1   19. (Original) An intermediate network device for use in processing and forward-

2 ing network messages in a computer network, the intermediate network device compris-

3 ing:

4   a plurality of line cards, one or more of the line cards capable of being connected

5 to portions of the computer network by respective communications media, each line card

6 configured to receive and forward network messages;

7   a message processing card; and

8   a common bus that provides inter-communication between the plurality of line

9 cards and the message processing card, wherein the message processing card comprises:

10   pattern matching engine for use in searching network messages for pre-

11   defined regular expressions and for determining matches thereto, the pattern

12   matching engine comprising:

13   a regular expression storage device for storing the pre-defined

14   regular expressions and one or more corresponding actions that are to be

15   applied to network messages matching the respective regular expressions,

16   the storage device including a content-addressable memory (CAM) having

17   a plurality of entries containing at least the pre-defined regular expres-

18   sions; and

19   a decoder circuit coupled to the regular expression storage device,

20   the decoder circuit configured to control an input to the CAM that includes

21   a given network message or selected portion thereof for comparison with

22   the regular expressions contained within the CAM, and to receive and de-

8

23   code an output returned from the regular expression storage device, the

24   output identifying the action to be applied to the given network message or

25   portion thereof,

26   whereby the CAM is configured such that each network message

27   or portion thereof input to the CAM is compared against all CAM entries

28   at the same time, allowing high-speed pattern matching of network mes-

29   sages.

1   20. (Original) The intermediate network device of claim 19 wherein each CAM

2   entry of the CAM further contains a tag such that all CAM entries having the same tag

3   define a single logical CAM within the CAM, and further wherein the decoder circuit is

4   configured to constrain the matching of a given CAM input to the CAM entries corre-

5   sponding to a selected logical CAM.

1   21. (Original) The intermediate network device of claim 20 wherein the pattern

2   matching engine further comprises a barrel shifter operatively coupled to the decoder cir-

3   cuit, the barrel shifter configured to provide a selected portion of a network message to

4   the CAM input as directed by the decoder circuit.

1   22. (Original) The intermediate network device of claim 21 wherein the pattern

2   matching engine further comprises a second decoder circuit coupled to the regular ex-

3   pression storage device, and a second barrel shifter operatively coupled to the second de-

9

4 coder circuit, wherein the second decoder circuit and second barrel shifter apply a se-

5 lected portion of a second network message to the regular expression storage device in

6 parallel fashion with the decoder circuit and barrel shifter.

1 23. (Original) The intermediate network device of claim 22 wherein the CAM

2 input comprises a message data space for storing the network message or portion thereof

3 provided by the barrel shifter, a tag space for storing the selected tag, and an end flag in-

4 dicating whether the message data space contains a last segment of the respective net-

5 work message.

1 24. (Original) The intermediate network device of claim 23 wherein the output

2 returned by the regular expression storage device comprises an operation code for identi-

3 fying the action to be applied to the respective network message and, to the extent further

4 searching is to be performed on the respective network message, an offset for use in di-

5 recting the barrel shifter to select a new message portion for a subsequent CAM input and

6 a tag to be appended to the subsequent CAM input.

1 25. (Original) A pattern matching engine for use in searching network messages

2 for pre-defined regular expressions and for determining matches thereto, the pattern

3 matching engine comprising:

4 means for storing the pre-defined regular expressions and one or more corre-

5 sponding actions that are to be applied to network messages matching the respective

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6   regular expressions, the storage means including a content-addressable memory (CAM)

7   having a plurality of entries containing at least the pre-defined regular expressions; and

8   means, coupled to the storage means, for decoding actions returned from the stor-

9   age means, the decoding means configured to control an input to the CAM that includes a

10   given network message or selected portion thereof for comparison with the regular ex-

11   pressions contained within the CAM, and to receive and decode an output returned from

12   the storage means, the output identifying the action to be applied to the given network

13   message or portion thereof,

14   whereby the CAM is configured such that each network message or portion

15   thereof input to the CAM is compared against all CAM entries at the same time, allowing

16   high-speed pattern matching of network messages.

11